



COLORADO

**Office of Economic Development
& International Trade**

House Finance Committee
And
House Business, Labor and Economic Workforce Development Committee

Senate Finance Committee
And
Senate Business, Labor and Technology Committee

Advanced Industry Accelerator Grant Program Update
as of
June 30, 2015

By the Colorado Office of Economic Development and International Trade

Advanced Industries (AI) are prime drivers of the U.S. and Colorado economies, comprised of engineering and R&D intensive companies that deliver products and services in industries ranging from aerospace to medical devices. Colorado's Advanced Industries include: Aerospace, Advanced Manufacturing, Bioscience, Electronics, Energy and Natural Resources including CleanTech, Infrastructure Engineering, and Technology and Information. The economic impact of these industries accounts for nearly 30% of the state's total wage earnings, nearly 30% of the total sales revenue across all industries within the state, and nearly 35% of the state's total exports.

The AI Accelerator Programs were created in 2013 to promote growth and sustainability in these industries by driving innovation, accelerating commercialization, encouraging public-private partnerships, increasing access to early-stage capital and creating a strong infrastructure that increases the state's capacity to be globally competitive.

As part of the statewide strategy to support these critical industries in their various phases of growth, OEDIT offers four types of grants and two global business programs. The four targeted grant types available are: Proof of Concept, Early-Stage Capital and Retention, Infrastructure Funding, and AI Exports. A network of consultants and an export training program are also available as part of the AI Global Business Programs to support these industries as they strive for worldwide markets.

Infrastructure Grants

In order to align private industry and Colorado Research Institutes, Commercialization Infrastructure Grants help fund Advanced Industry projects that substantially build or utilize existing infrastructure to support or enhance the commercialization of Advanced Industry products, assist Advanced Industry start-ups with mentoring or access to outside capital, or contribute to the development of an Advanced Industry workforce.

Infrastructure grants are used to assist in the implementation and execution of action items identified in Advanced Industry Strategic Plans, as developed through the Colorado Blueprint Key Industry Network initiatives. Infrastructure Grants may also be used to assist in the implementation of newly identified action items that are needed to accelerate such Advanced Industries.

In addition, infrastructure grants may also be used to leverage federal funding opportunities that address a specific need of an Advanced Industry.

Commercialization infrastructure funds have supported Colorado's involvement in three national manufacturing initiatives and two additional Colorado projects: development of a green energy park in the San Luis Valley and an analysis and strategy development for Colorado's Advanced Industries.

LIFT- Lightweight Innovations for Tomorrow

As described on their website, "LIFT, operated by the American Lightweight Materials Manufacturing Innovation Institute (ALMMII), is a public-private partnership to develop and deploy advanced lightweight materials manufacturing technologies, and implement education and training programs to prepare the workforce. ALMMII was selected through a competitive process led by the US Department of Defense under the Lightweight and Modern Metals Manufacturing Innovation (LM3I) solicitation issued by the U.S. Navy's Office of Naval Research. ALMMII is one of the founding institutes in the National Network for Manufacturing Innovation, a federal initiative to create regional hubs to accelerate the development and adoption of cutting-edge manufacturing technologies.

Professor Alan Luo at The Ohio State University and University Emeritus Professor David Matlock of the Advanced Steel Processing and Research Center at the Colorado School of Mines co-lead the TMP Thermomechanical processing research program for LIFT. Matlock and Luo note that TMP can yield improved and new properties for advanced high-strength steels, titanium alloys, aluminum alloys, and other metals. Matlock said, 'TMP allows us to enhance the strength of a material, its resistance to fracture, or its resistance to degradation by fatigue. Consequently, you can gain improved performance and allow for lighter-weight designs.' ”

Digital Manufacturing and Design Innovation Institute - DMDII

The Digital Manufacturing and Design Innovation Institute, a federally-funded research and development organization of UI LABS, (UI LABS is a Chicago-based research and commercialization collaborative, bringing Universities + Industries together to define problems, design partnerships and deliver scalable solutions to tomorrow's most important challenges), which encourages factories across America to deploy digital manufacturing and design technologies, so those factories can become more efficient and cost-competitive. Colorado committed \$1 million over a five year period to this initiative. To date no money has been spent on this effort, and the money has been repurposed to the Proof of Concept and Early Stage Capital and Retention Grants.

Institute for Advanced Composites Manufacturing Innovation - IACMI

IACMI's Wind Turbines Technology Area, located in Colorado, is focused on lowering the cost of wind energy while increasing the reliability of wind turbines. To reduce cost, improve quality, and increase recyclability, IACMI will target:

- Decreasing mold cycle time
- Integrating thermoplastic matrices into the current production process
- Augmenting the robustness of fabric placement through automation
- Conducting in-process nondestructive evaluations

Working with colleges and universities, composites companies, and national laboratories, IACMI is developing advanced composites manufacturing for turbine components including blades, hubs, and nacelles.

IACMI's Wind Turbines Technology Area consists of a core partner, the National Renewable Energy Laboratory, and four supporting partner institutions, including Colorado School of Mines; University of Colorado, Boulder; Colorado State University; and Iowa State University. Colorado School of Mines and NREL were awarded \$425,940 for budget period one for this initiative.

Capitalizing on the long and productive history of collaboration between NREL and the major wind industry OEM's, including Vestas, GE, Siemens, TPI Composites and LM Windpower, IACMI's Wind Turbine Technology Area is developing, testing and deploying transformational manufacturing methods, designs and materials that will result in increased penetration for wind power in the US energy market.

Six Infrastructure projects were funded in FY15 for a total of \$918,000.

Proof of Concept

Proof of Concept (POC) grants help fund research at Colorado Research Institutions with commercial applications. Grant Funding is used to identify and pull technologies from research institutions where they were discovered and connect them to the private sector where they can be developed into commercialize-

able products. These grants provide significant economic impact or competitive advantage for Colorado and the Advanced Industries by accelerating the pace of applied research and leading to the rapid commercialization of products and services. Grants support the commercialization of technologies at research institutions at two distinct stages along the commercialization pathway: Pre-Commercial Research (Phase I) and Commercialization Preparation (Phase II). In Fiscal Year 2015, the program awarded 22 grants to researchers at Colorado research institutions to bring their cutting-edge technologies closer to market. Over 42 grants have been funded since the program's inception. These grants are usually matched by funds from the technology transfer offices to allow the investigators to reach commercial milestones.

Early Stage Capital and Retention

Early Stage Capital and Retention (ESCR) grants provide Early Stage development grants to support technology commercialization funding product development in preparation for a product launch; or the advancement of a product or technology to achieve a commercial milestone that significantly increases the company's value and stability, and better positions the company for follow-on investment- including SBIR, angel funding or venture capital. The resulting product or service must be manufactured or performed in Colorado.

Under the Early Stage Capital and Retention Grant Program, 26 grants helped Colorado companies further advance in fiscal year 2015. Since the program's inception, 44 Colorado companies have been funded. Early Stage Capital and Retention grants allow early stage businesses to complete commercial activity such as production, sales and distribution, and business growth. Funds can also be used for business start-up activities, market validation and pre-production prototypes.

The program's statute requires an allocation of at least 15% of funds to Proof of Concept grants, 15% of the funds to Early Stage Capital and Retention Grants, and up to 15% of the funds to Commercialization Infrastructure. The table below summarizes all grants awarded in fiscal year 2015.

| Status | Program | # of Awards | \$ Awarded | \$ Spent to date | Jobs Created | Jobs Retained | Companies created | Follow-On Capital | IP | Projected Annual Revenue |
|----------------------|-----------------------------------|-------------|--------------------|--------------------|--------------|---------------|-------------------|--------------------|-----------|--------------------------|
| | Proof of Concept | 22 | \$1,447,149 | \$714,956 | N/A | N/A | N/A | N/A | N/A | N/A |
| Active Grants | Early Stage Capital and Retention | 26 | \$5,183,625 | \$2,308,055 | 30.75 | 34 | 1 | \$6,934,373 | 13 | \$10,455,132 |
| | Infrastructure | 6 | \$918,000 | \$86,800 | | | | | | |
| Totals | | | \$7,548,774 | \$3,109,811 | 30.75 | 34 | 1 | \$6,934,373 | 13 | \$10,455,132 |

Approximately \$13,912,041 from the Advanced Industry Fund has been granted. The chart above shows returns realized during the grant term and those that continue to accrue as the technologies become closer to and actually enter the market-place. To date, the program successes include the creation of 135 new jobs and approximately 170 jobs retained. Additionally, these funds have helped the technologies acquire an additional \$7,701,193 dollars in grants and investments to further commercialize these advanced technologies.

Below are a couple of successful stories about AI grantees and how the Advanced Industry Grant Program has provided critical gap funding to technologies in early development.

- Lightning Hybrids, a Loveland based company that makes hybrid systems for medium and heavy-duty fleet vehicles, grew from 14 employees to 31 in 2014. Lightning Hybrids was awarded \$500,000 and has seen accelerated growth. The company recently opened a London subsidiary. The expansion has led to hiring locally as manufacturing ramps up. The company's growth was fueled by an investment from Castrol innoVentures, the investment arm of lubricant manufacturer Castrol. The company saw \$2.5 million in sales for 2015 and its expected projections for 2016 are \$23.5 million.
- Kapteyn-Murname Laboratories Inc (KMLabs), a Boulder based company is expected to grown by 10 to 15 employees as a result of raising a \$5.5 million funding round. KMLabs was awarded \$200,000. The company makes custom laser systems for research applications that are sold mostly to universities and research institutes.

Fifty-Three Projects were approved for funding in Fiscal Year 2014-2015.

| Program | Grantee | Associated Research Institution | PI | Subject | Award \$ |
|-------------------------|---------------------------|---------------------------------|--------------|--|--------------|
| Proof of Concept Grants | University of Colorado | CU | Zhang | Developing a novel class of advanced polymers for commercialization in the orthopedics/prosthetics industry | \$148,410 |
| | Colorado School of Mines | CSM | Midson | Multilayer Coatings for Service Life Extension of Components used in Aerospace and Manufacturing | \$126,706 |
| | Colorado State University | CSU | Kota | Durable De-icing Coatings | \$55,000.00 |
| | Colorado State University | CSU | Chandrasekar | Development of low-cost, low-altitude, vertical pointing dual-polarization radar | \$55,000.00 |
| | Colorado State University | CSU | Sharvelle | Demonstration of a Prototype Leach-Bed Reactor for Anaerobic Digestion of Dry Waste | \$55,000.00 |
| | Colorado State University | CSU | Volckens | Low-Cost Wearable Air Sampler | \$52,232.00 |
| | Colorado State University | CSU | Chen | GiVL as a Sustainable Carbon Source for Fuels, Chemicals, and Materials | \$55,000.00 |
| | University of Colorado | CU | Weimer | Direct Ink Writing Using Particle ALD Core/Shell Precursors for Net-Shape Fabrication of 3D Advanced Ceramic Structures | \$90,000.00 |
| | University of Colorado | CU | Smalyukh | Switchable Plasmonic Nanoparticles Codispersion for Smart Window Application | \$135,000.00 |
| | University of Colorado | CU | Emery | Flight Validation; Airborne Dual Frequency LIDAR to Detect Petrochemical Leaks. | \$150,000 |
| | University of Colorado | CU | Raj | Advanced Manufacturing of a Novel Architecture of a Nanocomposite High-Rate Li-Ion Battery Anode | \$90,902 |
| | National Jewish Health | NJH | Hoffman | KneeTap™ Commercial Proof of Concept – Phase II | \$150,000 |
| | Colorado School of Mines | CSM | Cox | Pre-commercial proof-of-concept for phage-based MALDI-TOF MS bacterial ID and antibiotic resistance determination | \$150,000 |
| | Colorado School of Mines | CSM | Durfee | Solid-State Laser Pumping with Advanced High-Brightness LED Sources | \$22,525 |
| | Colorado School of Mines | CSM | Celik | Development of a USB Computer Interface for Wrist Gimbal Stroke Rehabilitation Exoskeleton | \$25,125 |
| | Colorado School of Mines | CSM | Fleckenstein | Casing Rotation and Seal Test Invention Prototype | \$26,250 |
| | University of Colorado | CU | Nease | EMRLens | \$29,999 |
| | University of Colorado | CU | Levey Brown | CoACH helps medical practices understand the financial and operational impact of new reimbursement and care delivery models. | \$30,000 |
| | University of Colorado | CU | Levey Brown | IHealthConnect (IHC) solves a difficult problem in healthcare; electronically collecting data from patients outside of a visit | \$30,000 |
| | University of Colorado | CU | Holtrop | CM Connector links a wide variety of disparate and siloed care delivery apps | |

| | | | | | |
|---|---------------------------|--------|----------------|---|-----------|
| | | | | with a patient's care team, allowing them to share data and operate in the context of the patient's specific care plan. | \$30,000 |
| | University of Colorado | CU | Kwan | Filament is a web/mobile-based digital health system that connects patients to community-based resources. | \$30,000 |
| | University of Colorado | CU | Casey | Deliver of an easy to use, accurate and reliable handheld device, which will fill a definite clinical need to diagnose and treat conductive hearing loss. | \$35,000 |
| Early Stage Capital and Retention Grants | Ascentia Imaging | | Mercure/Dowski | Ascentia Imaging, Inc. has invented a new optical/digital technology to perform specialized measurement tasks | \$150,000 |
| | Beneath the Ink | | Hawkins | Beneath the Ink is an enhancement authoring platform which provides a superior user experience through the simple, fast, and affordable addition of rich (enhanced) content to ANY digital text. | \$245,675 |
| | Clear Comfort Water | | Berens | Clear Comfort system delivers its proprietary and patented Advanced Oxidation Processes (AOPs) to eliminate or reuse chlorine in pools and spas. | \$250,000 |
| | CO2Nexus, Inc | | Kinsman | The project will be to commercialize our advanced barrier (pass-thru) liquid CO2 textile / garment processing equipment. | \$250,000 |
| | ION Engineering | CU | Brown | ION's first product is a solvent process for post-combustion coal-fired power plants where ION will provide solvent engineering, end-user licenses, solvent supply and maintenance to customers. | \$250,000 |
| | Lifeloc Technologies, Inc | | Knott | Development of a portable THC Breathalyzer that can be used by law enforcement at roadside and in the workplace and healthcare segments to help deter, detect and monitor drugged driving due to marijuana. | \$250,000 |
| | Synkera Technologies, Inc | | Deiningner | Synkera's sensors enable life and health saving additions to mobile and wireless devices through detection of carbon monoxide, breath alcohol or other environmental hazards | \$200,000 |
| | KMLabs | CU/CSM | Wood | KMLabs is the technology leader for high power, highest performance femtosecond laser systems, and the market definer for coherent EUV and x-ray sources. | \$250,000 |
| | Mighty Oak Medical | | Frey | Mighty Oak Medical was created to bring surgeons and engineers together to create cutting-edge technology in the field of medical devices. Its emphasis is on spinal surgery and on bringing true innovation to the operating room. | \$250,000 |
| | Optienz Sensors, LLC | CSU | Witt | The product consists of an optical measurement system (a small opto-electronic hardware device) connected to quick-connect consumable sensor tips via a fiber optic cable | \$150,000 |
| | Rachio, Inc | | Stone | Rachio develops smart sprinkler controllers that save water, save money | \$250,000 |

| | | | | | |
|--|-------------------------------|-----|-----------|---|-----------|
| | | | | and keep your landscape looking it's best. Instead of using preset egg timers, our Controller pairs with your smart phone and uses the location data to track local rain, creating a custom irrigation plan. | |
| | Siva Therapeutics | CSM | Pagliario | The product we will be advancing with this grant is combination therapy for solid tumor cancers, using both SivaRod Targeted Hyperthermia and pathway inhibitor drugs. | \$100,000 |
| | Spectrabotics | | Haynie | Spectrabotics is revolutionizing Precision Agriculture through the use of small, autonomous Unmanned Aerial Systems hosting advanced spectral cameras to image crop fields. | \$50,000 |
| | Tusaar | CU | Khanna | Tusaar has developed a proprietary chemical process for extracting metal ions from various solutions. | \$150,000 |
| | ProtechSure Scientific | CU | Wolach | Symphosil® is a new OTC Skin Protectant which will help cancer patients to better tolerate their treatments and lower the likelihood of severe skin damage. | \$160,000 |
| | CardioNXT | | Mackin | The CardioNXT iMap system creates and displays Electroanatomical Mapping Geometries to locate problem areas of atrial fibrillation while allowing Doctors to speed up the procedure time and obtain more accurate results than those currently available with today's mapping technologies. | \$250,000 |
| | Black Swift Technologies, LLC | CU | Cheetham | Black Swift Technologies (BST) is working to commercialize the SwiftPilot Pro avionics systems for small unmanned aircraft systems (sUAS). | \$240,000 |
| | Vairex Air Systems | | Milburn | VAIREX is developing a full line of air systems for the 1-25 kW fuel cell market, focused on fuel cells for telecommunications backups, forklifts, distributed generation and electric vehicle range extenders. | \$150,000 |
| | AMP Robotics | CU | Horowitz | Cognitive Robotics is bringing modern robotics to the recycling industry. | \$98,250 |
| | Special Aerospace Services | | Bulk | Development of Advanced Manufacturing & Propulsion Test Center in Colorado | \$250,000 |
| | Agribotix | | Hoff | Agribotix is a drone-enabled software company, providing drone technologies and advanced data analytics to the precision agriculture market. | \$250,000 |
| | Katasi, LLC | | Tibbitts | Katasi Groove is the world's first Cloud based distracted driving solution, widely recognized as the first effective and broadly accepted technical solution to distracted driving. | \$183,800 |
| | Ocugen | CU | Kang | Ocugen is a biopharmaceutical company and our mission is to deliver best-in-class solutions to patients suffering from sight threatening eye diseases. | \$230,900 |
| | Fluonic, Inc | | Genosar | Fluonic's brings to infusion pumps what the iPhone brought to the | \$250,000 |

| | | | | | |
|------------------------------|------------------------------------|-----|----------|--|-----------|
| | | | | telecommunications industry and the gas pedal, speedometer and cruise control brought to the car. We can do what no one else can do with our patented technology. | |
| | Evolutionary Genomics, Inc | | Warnecke | Evolutionary Genomics developed and patented the Adapted Traits Platform using evolutionary analysis to find genes that are responsible for traits of interest in agricultural crops. | \$100,000 |
| | Prieto Battery | CSU | Prieto | Prieto's mission is to commercialize a patented 3D Lithium-ion battery technology that delivers transformational performance at a competitive cost using non-toxic materials with the ability to customize shapes. | \$50,000 |
| | | | | | |
| Infrastructure Awards | Colorado Bioscience Institute | | Giles | Generate an industry assessment report for Bioscience including an asset map and sector analysis. | \$250,000 |
| | Colorado Mesa University | | Wagner | Support development by providing technology and equipment for the new Maverick Innovation Center housed at CMU. | \$250,000 |
| | Rocky Mountain Innovation Partners | | Denton | Build a technology transfer and commercialization network in Colorado Springs. | \$250,000 |
| | Special Aerospace Services | | Bulk | In partnership with CU and MSU, develop an Advanced Propulsion Research and Apprenticeship Program. | \$250,000 |
| | TinkerMill | | Thomas | Expand the Advanced Prototype Manufacturing Facility, develop the Gigabit Information Technology Center infrastructure, and provide staffing and program needs for the two facilities. | \$68,000 |